香港浸會大學理學院
HKBU Faculty of Science

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

PhD Candidate:	Mr. Siqi LIU
Date	April 9, 2021 (Friday)
Time:	9:00 am – 11:00 am (35 mins presentation and 15 mins Q & A)
Venue:	Zoom ID: 955 9136 2815 (The password and direct link will only be provided to registrants)
Registration:	https://bit.ly/sem-zm (Deadline: 5:00pm, April 7, 2021)

3D Mask Face Presentation Attack Detection with Remote Photoplethysmography

Abstract

Since face recognition has been widely employed in a variety of applications, including e-commerce and access control of unmanned security doors and mobile phones, security issues of face recognition systems have received increasing attention. Face presentation attack (PAD) is one of the greatest challenges in practical face recognition systems since images or videos of a user's face can be easily acquired and printed. With the advancement of 3D printing and material technologies, super-real facial masks can successfully spoof existing face recognition systems at an affordable cost. Several approaches have been proposed to exploit appearance differences between masks and real faces. Although encouraging results are reported on single dataset, they can hardly generalize across different types of masks and record settings in real application scenarios.

In this thesis, we propose to tackle 3D mask face PAD by analyzing facial heartbeat signals through the remote photoplethysmography (rPPG) technique. Such a liveness cue is intrinsic to characterizing a true face and therefore can be used to detect a 3D mask, regardless of the material and quality of the mask.

We first build a new 3D mask attack dataset called HKBU-MARs to simulate the real-world variations including different mask types, lighting conditions, and camera settings. For using rPPG for 3D mask face PAD, we first propose a local solution which extracts an rPPG correlation pattern from multiple local facial regions and learn the corresponding confidence map to encode the robust spatial information of heartbeat strength. On top of that, we try to identify the heartbeat vestige from the observed noisy rPPG signals. Then, an rPPG correspondence feature with the noise-aware template learning and verification framework is developed. The two rPPG-spectrum-based methods require long time observation to identify the liveness information. To shorten the observation time, we further propose a fast rPPG-based solution by analyzing the similarity of local facial rPPG signals in the time domain. Furthermore, a spatiotemporal-convolution-based rPPG estimator for general use is designed, which could be a fundamental direction of boosting the performance of rPPG-based 3D mask face PAD.

***** ALL INTERESTED ARE WELCOME *****